



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

# **FHWA-47 REPORT**

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## **FEDERAL-AID HIGHWAY CONSTRUCTION**

### **MATERIALS USAGE FACTORS**

**2000-2001-2002**

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Source: HIPA-10, Office of Program Administration





U.S. Department  
of Transportation

**Federal Highway  
Administration**

# Memorandum

Subject: **ACTION:** Federal-Aid Highway Construction  
Materials Usage Factors 2000-2001-2002

Date: JUN 29 2004

From:

Dwight A. Horne *Dwight A. Horne*  
Director, Office of Program Administration

Reply

Attn. of: HIPA-10

To: Division Administrators

The materials usage data summarized herein is compiled from reports (Form FHWA-47), Statement of Materials and Labor Used By Contractors on Highway Construction Involving Federal Funds) prepared by contractors upon completion of Federal-aid highway construction contracts and submitted to Headquarters during calendar years 2000-2001-2002.

The data is intended to aid materials suppliers, highway contractors, engineers, economists and others planning to meet the needs of the highway construction program in the United States.

In the past, similar data has been published annually in an expanded format as a series of four pamphlets. The first pamphlets covered the 1953-54-55 period and the "Bulletin" issues covered the 1982-83-84 period through the 1995-96-97 period. The most recent issue will be in the current format. Copies of these older issues can be obtained by contacting the Federal Highway Administration, Office of Program Administration, (HIPA-10), 400 Seventh Street SW, Washington, D.C. 20590 or by telephone at 202 366-4636.





## HOW TO USE THESE FACTORS

This information was compiled from reports received during 2000-2001-2002 from highway contractors upon completion of Federal-aid highway projects on the National Highway System (NHS). Contracts on the NHS less than \$1.0 million as well as all non-NHS projects are not included. For the 2000-2001-2002 period, materials usage was reported for approximately 2,221 projects completed at a total cost of about \$13.5 billion.

These materials usage factors are quotients obtained when the total quantity reported for a particular material is divided by the \$13.5 billion total cost of all projects reported. The quotients or factors are reported in terms of quantity (ton, LF, gal, etc.) per \$1.0 million of total project cost. As such, the factors represent usage based on value of the construction dollar at the time these contracts were awarded. Factors for more recent contracts can be expected to reflect changes in the purchasing power of the construction dollar at the time these contracts were awarded. Factors for more recent contracts can be expected to reflect changes in the purchasing power of the construction dollar.

Investigations have shown that for comparable standards of design, materials usage factors on non-federal-aid projects do not differ appreciably from those developed for Federal-aid construction. These factors may thus be applied generally to any program of highway construction expenditures to obtain an estimate of material needs. Estimated construction expenditures for all public highways by year and by state are shown on Pages 5 and 6.

It should be recognized that the factors shown for individual States may not always be truly representative of normal usage if they are based on comparatively low volumes of work and/or temporary disproportionate cost distributions of the three major highway construction operations, i.e., grading surfacing and structures. In most States, however, during the 3-year period, the volume of work is large enough and the operational distribution is of proper proportion to reflect representative usage factors.

For further information, contact

Office of Infrastructure  
Office of Program Administration  
(202) 366-4636

U. S. AVERAGE  
HIGHWAY CONSTRUCTION MATERIALS USAGE FACTORS  
QUANTITIES OF MATERIALS PER MILLION DOLLARS CONTRACT CONSTRUCTION COST  
3-YEAR FACTORS

YEARS	CEMENT	BITUMEN	AGGREGATES			STEEL					CONCRETE PIPE	CLAY PIPE	LUMBER	PETROLEUM PRODUCTS
			PURCHASED BY CONTRACTOR	PRODUCED BY CONTRACTOR	TOTAL	STRUCTURAL STEEL	REINFORCED STEEL	CORRUGATED STEEL CULV	MISC STEEL	TOTAL STEEL				
	Tons	Tons	Thous Tons	Thous Tons	Thous Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	MBF	Thous Gals
2002-01-02	446	331	12	3	15	17	38	1	3	59	51	0	3	19
1999-00-01	457	344	12	3	15	18	40	1	3	62	55	0	3	20
1998-99-00	450	350	12	3	15	19	41	1	2	63	58	0	3	21
1997-98-99	472	346	13	3	16	21	43	2	2	68	63	0	4	21
1996-97-98	498	338	13	3	16	23	42	2	3	70	67	0	5	21
1995-96-97	738	442	14	3	17	24	45	2	3	74	73	0	7	23
1994-95-96	855	455	15	4	19	25	46	2	4	77	76	1	8	25
1993-94-95	1274	452	16	4	20	27	48	2	4	81	79	1	8	26
1992-93-94	669	359	25	4	29	28	51	2	5	86	82	1	8	26
1991-92-93	603	351	14	4	18	33	50	2	5	90	85	2	7	25
1990-91-92	629	376	15	5	20	33	49	3	4	89	87	3	7	25
1989-90-91	660	382	15	5	20	33	48	3	4	88	88	4	6	26
1988-89-90	693	404	16	5	21	28	48	3	3	82	90	5	6	28
1987-88-89	689	403	15	5	20	29	49	3	3	84	92	6	6	31
1986-87-88	665	456	16	6	22	30	46	4	3	83	93	6	6	33
1985-86-87	621	476	15	6	21	37	46	4	4	91	94	6	6	34
1984-85-86	545	490	15	6	21	43	46	4	5	98	94	5	6	36
1983-84-85	554	462	15	6	21	50	51	4	6	111	96	5	10	38
1982-83-84	560	445	15	7	22	56	55	5	5	121	99	5	11	40
1981-82-83	583	462	16	6	22	58	58	5	5	126	110	5	12	44
1980-81-82	625	500	17	7	24	60	59	7	5	131	123	5	10	48
1979-80-81	728	564	20	7	27	62	69	8	6	145	134	6	12	54
1978-79-80	905	612	23	9	32	68	84	9	7	168	154	7	16	62
1977-78-79	1016	628	24	10	34	78	98	9	8	193	165	7	18	67
1976-77-78	1101	633	24	11	35	89	106	11	9	215	181	7	19	76
1975-76-77	1142	676	25	12	37	96	113	12	11	232	189	7	22	80
1974-75-76	1206	703	27	15	42	126	127	13	12	278	201	8	30	87
1973-74-75	1349	753	29	17	46	140	145	14	14	313	223	9	38	89
1972-73-74	1560	768	30	18	48	148	172	14	15	349	254	11	40	93

FOOTNOTES:

Cement includes Portland and natural cement for all highway uses except concrete culvert.

Bitumen includes liquid asphalts (primes, tacks, etc.) and asphaltic cement used in bituminous concrete.

Aggregates purchased include aggregates in ready-mixed concrete and bituminous paving materials.

Structural steel includes shapes, plates, H-piles and sheet piles.

Reinforcing steel includes plain and epoxy-coated rebars used in pavements and structures.

Corrugated steel culvert includes CM pipe, structural plate pipe and pipe arches.

Miscellaneous steel includes steel pipe, manhole covers, joint devices, tubular piles, nails, etc.

Concrete pipe includes plain and reinforced pipe. Culvert reinforcement is about 2% weight of pipe.

Lumber includes plywood, pressed wood and other form lumber, falsework, bridge timbers and flooring, guardrail and fence posts, etc. - timber piles are not included.

Petroleum products include gasoline, lubricating oil, grease (8 Lbs/Gal), diesel fuel, fuel oil, etc.

Where "0" appears, quantities reported were negligible; "-" represents no data reported.

STATE - BY - STATE  
HIGHWAY CONSTRUCTION MATERIALS USAGE FACTORS  
QUANTITIES OF MATERIALS PER MILLION DOLLARS CONTRACT CONSTRUCTION COST  
2000-01-02

STATE			AGGREGATES			STEEL								
	CEMENT	BITUMEN	PURCHASED BY CONTRACTOR	PRODUCED BY CONTRACTOR	TOTAL	STRUCTURAL STEEL	REINFORCED STEEL	CORRUGATED STEEL CULV	MISC STEEL	TOTAL STEEL	CONCRETE PIPE	CLAY PIPE	LUMBER	PETROLEUM PRODUCTS
	Tons	Tons	Thous Tons	Thous Tons	Thous Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	MBF	Thous Gals
Alabama	156	593	15	0	15	2	19	0	1	22	110	-	0	15
Alaska	40	239	4	11	15	2	18	12	2	34	1	-	0	25
Arizona	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arkansas	911	121	11	4	15	56	48	1	8	113	33	-	4	29
California	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Colorado	625	401	11	4	15	4	22	2	5	33	32	-	2	20
Connecticut	123	459	8	1	9	50	18	1	2	71	7	-	2	10
Delaware	86	792	13	0	13	0	2	-	0	2	127	-	0	11
Wash., D.C.	160	4	1	0	1	19	20	-	46	85	1	-	21	5
Florida	236	287	10	1	11	14	15	0	1	30	68	-	0	27
Georgia	197	534	16	0	16	8	35	0	3	46	48	-	1	16
Hawaii	120	65	3	1	4	1	7	0	0	8	17	0	3	5
Idaho	76	429	19	31	50	0	4	6	1	11	27	-	1	30
Illinois	222	421	11	1	12	17	17	1	2	37	65	0	2	12
Indiana	443	427	16	0	16	17	16	1	1	35	16	2	1	13
Iowa	789	209	19	0	19	17	31	3	2	53	73	0	1	33
Kansas	645	212	11	1	12	13	31	2	1	47	38	-	5	26
Kentucky	42	520	12	0	12	0	1	1	0	2	-	-	0	8
Louisiana	235	423	10	2	12	6	16	0	0	22	7	-	3	8
Maine	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maryland	135	414	13	1	14	31	32	1	4	68	38	-	5	22
Massachusetts	343	12	4	0	4	19	108	0	1	128	17	-	8	5
Michigan	836	230	14	1	15	10	18	1	3	32	40	0	1	10
Minnesota	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mississippi	153	353	17	4	21	16	33	0	1	50	85	-	2	37
Missouri	511	288	10	1	11	31	27	1	6	65	66	-	2	18
Montana	78	689	5	20	25	6	8	5	0	19	56	-	1	29
Nebraska	293	674	14	0	14	14	19	1	0	34	37	-	5	30
Nevada	457	279	7	9	16	12	66	0	1	79	29	-	2	18
New Hampshire	162	281	24	2	26	30	12	1	1	44	111	-	1	22
New Jersey	145	144	6	0	6	34	30	0	13	77	38	-	3	7
New Mexico	10	438	10	22	32	1	4	4	0	9	-	-	0	48
New York	88	290	7	0	7	35	14	0	1	50	4	-	3	6
North Carolina	215	468	13	0	13	7	13	2	5	27	98	-	1	35
North Dakota	961	690	16	20	36	1	11	1	0	13	31	-	1	40

STATE-BY-STATE  
HIGHWAY CONSTRUCTION MATERIALS USAGE FACTORS  
QUANTITIES OF MATERIALS PER MILLION DOLLARS CONTRACT CONSTRUCTION COST  
2000-01-02

STATE	AGGREGATES					STRUCTURAL STEEL	REINFORCED STEEL	CORRUGATED STEEL CULV	MISC STEEL	TOTAL STEEL	CONCRETE PIPE	CLAY PIPE	LUMBER	PETROLEUM PRODUCTS
	CEMENT	BITUMEN	PURCHASED BY CONTRACTOR	PRODUCED BY CONTRACTOR	TOTAL									
	Tons	Tons	Thous Tons	Thous Tons	Thous Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	MBF	Thous Gals
Ohio	307	442	14	0	14	30	29	0	4	63	20	1	4	9
Oklahoma	509	669	18	1	19	6	33	3	1	43	78	-	1	22
Oregon	211	433	13	3	16	7	30	1	5	43	27	-	5	19
Pennsylvania	515	203	12	2	14	18	21	1	2	42	39	1	3	16
Rhode Island	147	338	7	2	9	10	11	0	1	22	45	0	4	23
South Carolina	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Dakota	818	434	14	6	20	10	50	2	9	71	51	-	1	31
Tennessee	234	593	23	0	23	27	34	0	3	64	94	-	1	10
Texas	667	305	12	2	14	13	85	0	1	99	99	-	3	20
Utah	418	382	17	16	33	14	11	3	2	30	21	-	3	27
Vermont	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Virginia	0	242	17	0	17	0	0	-	0	0	67	-	0	3
Washington	237	435	10	3	13	18	29	1	1	49	18	-	4	15
West Virginia	112	307	7	0	7	43	16	4	1	64	11	-	2	29
Wisconsin	577	196	10	2	12	29	28	1	3	61	62	-	1	17
Wyoming	68	487	3	12	15	4	18	2	1	25	11	-	3	38
Puerto Rico	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U.S. AVERAGES														
2000-01-02	446	331	12	3	15	17	38	1	3	59	51	0	3	19
1999-00-01	457	344	12	3	15	18	40	1	3	62	55	0	3	20
1998-99-00	450	350	12	3	15	19	41	1	2	63	58	0	3	21

FOOTNOTES:

Cement includes Portland and natural cement for all highway uses except concrete culvert.  
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 Lumber includes plywood, pressed wood and other form lumber, falsework, bridge timbers and flooring, guardrail and fence posts, etc. - timber piles are not included.  
 Petroleum products include gasoline, lubricating oil, grease (8 Lbs/Gal), diesel fuel, fuel oil, etc.

Where "0" appears, quantities reported were negligible; "-" represents no data reported.



**2002 Estimated Construction  
Expenditures  
for  
All Public Highways  
(Federal, State, and Local Funds excluding  
cost of right-of-way and engineering; also  
does not include maintenance expenditures)**

<u>Year</u>	<u>\$ Billion</u>	<u>Year</u>	<u>\$ Billion</u>
1944	0.336	1973	9.722
1945	0.331	1974	10.962
1946	0.719	1975	12.224
1947	1.267	1976	11.806
1948	1.620	1977	10.848
1949	1.939	1978	12.663
1950	2.069	1979	15.104
1951	2.273	1980	17.449
1952	2.597	1981	16.951
1953	2.989	1982	15.678
1954	3.670	1983	16.578
1955	3.915	1984	19.169
1956	4.043	1985	22.095
1957	4.586	1986	24.054
1958	5.055	1987	25.274
1959	5.238	1988	27.226
1960	4.913	1989	27.028
1961	5.301	1990	28.190
1962	5.727	1991	28.997
1963	6.256	1992	28.825
1964	6.488	1993	30.906
1965	6.494	1994	33.494
1966	7.207	1995	35.084
1967	7.532	1996	37.414
1968	8.112	1997	38.063
1969	8.128	1998	41.194
1970	9.235	1999	45.840
1971	9.868	2000	49.730
1972	9.789	2001	52.828
		2002	54.863*

\* Preliminary

\*\* Forecast - No Longer available \*\*

SOURCE: FHWA, Office of Highway Information Management,  
Highway Funding and Motor Fuels Division

**Total Estimated Construction Expenditures for All Public Highways by State 1/**  
(Thousands of Dollars)

	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	Preliminary <u>2/</u> <u>2002</u>
Alabama	727,739	561,383	705,503	905,862	946,536
Alaska	201,687	233,509	306,359	272,834	329,586
Arizona	752,483	1,198,434	1,165,382	1,251,664	1,500,147
Arkansas	502,768	384,356	438,862	591,563	797,264
California	3,746,749	3,728,853	4,031,492	4,316,250	4,818,694
Colorado	870,691	854,163	840,486	1,123,147	1,223,493
Connecticut	448,191	427,704	454,846	425,693	484,094
Delaware	190,075	180,846	237,747	285,870	204,330
Dist. of Columbia	119,515	134,318	168,598	265,495	272,317
Florida	1,753,067	2,064,627	2,127,992	2,359,989	2,852,598
Georgia	1,258,777	1,354,244	1,299,199	1,418,416	1,445,685
Hawaii	168,704	160,341	138,755	174,486	178,487
Idaho	243,277	271,692	286,866	272,884	307,853
Illinois	1,638,463	1,348,513	1,719,437	2,270,251	2,533,004
Indiana	843,099	781,586	1,052,066	2,196,764	956,080
Iowa	636,023	670,494	824,445	714,953	729,507
Kansas	634,197	685,103	695,229	721,737	729,734
Kentucky	678,992	806,599	1,184,470	1,081,997	1,180,724
Louisiana	664,463	706,777	750,735	561,672	627,241
Maine	178,311	186,705	203,679	177,910	267,613
Maryland	629,579	641,809	666,557	780,677	902,033
Massachusetts	1,560,603	2,515,344	2,068,341	1,886,170	1,651,768
Michigan	1,302,815	1,546,600	1,667,278	1,901,342	1,842,075
Minnesota	1,123,977	1,215,065	1,383,378	1,405,079	1,433,106
Mississippi	465,437	616,269	626,311	520,514	664,183
Missouri	816,346	974,133	1,109,416	1,235,824	1,281,514
Montana	197,213	224,084	260,455	222,611	250,394
Nebraska	425,876	421,731	469,534	368,492	414,404
Nevada	179,755	317,924	353,680	283,548	262,451
New Hampshire	131,356	135,934	130,579	151,493	130,347
New Jersey	871,821	1,276,909	1,790,484	1,354,290	1,772,406
New Mexico	280,801	576,079	507,504	737,808	524,202
New York	2,852,131	3,478,078	3,504,674	3,590,554	4,041,854
North Carolina	1,011,607	1,141,713	1,207,321	1,280,004	1,346,287
North Dakota	219,423	255,590	206,053	239,332	239,238
Ohio	1,723,613	1,683,390	1,873,068	1,777,351	1,839,688
Oklahoma	472,430	661,031	789,930	822,888	666,533
Oregon	561,775	494,041	473,609	551,535	507,270
Pennsylvania	1,376,534	1,655,074	1,952,117	2,384,328	2,260,857
Rhode Island	143,550	107,629	90,265	85,305	105,929
South Carolina	436,294	423,346	436,978	514,762	557,638
South Dakota	234,843	244,513	304,014	323,682	313,315
Tennessee	656,624	600,628	694,437	692,521	684,446
Texas	2,792,106	3,168,537	3,573,956	3,461,644	3,671,477
Utah	789,092	775,415	720,383	519,390	543,025
Vermont	109,124	135,245	148,530	128,383	117,708
Virginia	1,136,897	1,187,064	1,100,960	1,139,619	1,246,405
Washington	855,332	849,365	922,894	894,016	1,036,896
West Virginia	435,384	430,512	497,492	612,087	517,507
Wisconsin	956,378	1,101,135	1,229,687	1,212,519	1,288,838
Wyoming	188,015	246,360	261,211	210,651	246,645
Undistributed	0	0	76,800	151,119	118,030
Total	41,194,002	45,840,794	49,730,044	52,828,974	54,863,453

1/ Includes estimates prepared by Federal Highway Administration.

2/ State expenditures are final. Federal and local government expenditures are estimated.



